AMBLER ACCESS PROJECT

Draft 2022 Annual Work Plan

Alaska Industrial Development and Export Authority
813 West Northern Lights Boulevard
Anchorage, Alaska 99503

March 2022

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EXECUTIVE SUMMARY

In conformity with Stipulation VII.B.i, *Annual Work Plan*, of the Programmatic Agreement for the Ambler Mining District Industrial Access Road, the Alaska Industrial Development and Export Authority is submitting this draft Annual Work Plan for 2022 to be reviewed by the Bureau of Land Management, the Alaska State Historic Preservation Office, the National Park Service, Advisory Council on Historic Preservation, U.S. Army Corps of Engineers, Alaska Department of Natural Resources, and Consulting Parties to the Programmatic Agreement for the Ambler Access Project. The purpose of this draft Annual Work Plan is to provide Signatories, Invited Signatories, and Consulting Parties of the Programmatic Agreement executed for the Project with sufficiently detailed information regarding proposed Project activities in the 2022 field season (May 2022 and end by April 30, 2023) in accordance with the Alternative Four Step Process outlined in the stipulations of the Programmatic Agreement.

The Work Focus in the Draft Annual Work Plan for 2022

Proposed work in the 2022 field season is within the Project Pre-Construction Phase (Appendix B) and builds upon the 2021 field season activities. The following activities will advance the preliminary design and engineering phase towards a final investment decision for the Project. These activities will focus on:

1. Cultural Resources Inventory and Monitoring Activities
2. Site Preparation and Landing Zones
3. Engineering Reconnaissance
4. Hydrological and Hydraulic Investigations
5. Land Survey and Right-Of-Way Activities
6. Fish Habitat Studies
7. Wetlands Investigations
8. Stakeholder Outreach Activities
9. Geophysical Surveys and Probing
10. Geotechnical Drilling

Cultural Resources Field Surveys in 2022

The 2022 cultural resources field surveys guided by the survey strategy contained within this draft 2022 Annual Work Plan will be directed at 54 discrete Project components (cultural resources study areas) consisting of potential bridge locations (n=15) and selected potential primary and secondary material sites (n=39). The results of these surveys will be reported to Programmatic Agreement Signatories and Consulting Parties in accordance with the Alternative Four Step Process. Cultural resources surveys will be conducted by Alaska Industrial Development and Export Authority's cultural resources consultant, Northern Land Use Research Alaska, LLC.

APPENDIX B: 2022 PRE-CONSTRUCTION PHASE PLAN

AMBLER ACCESS PROJECT

Phase Plan

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March 2022

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1.0 INTRODUCTION AND PURPOSE

1.1 Introduction

In April 2020, the Bureau of Land Management (BLM), Alaska State Historic Preservation Office (SHPO), National Park Service (NPS), Advisory Council on Historic Preservation, U.S. Army Corps of Engineers (USACE), Alaska Department of Natural Resources, and Alaska Industrial Development and Export Authority (AIDEA) executed a Programmatic Agreement (PA) for AIDEA's Ambler Access Project (Project). The Project's Joint Record of Decision (between BLM and USACE) was subsequently issued on July 23, 2020 (85 Federal Register 45440). The PA provides an alternate process by which BLM (as the lead federal agency) may comply with Section 106 of the National Historic Preservation Act (54 U.S. Code 306108) and requires AIDEA to provide annual reporting on Project activities.

1.2 Purpose

AIDEA has prepared this Phase Plan to meet the Project's PA reporting requirements and to provide PA signatories and consulting parties with a high-level overview of the types of Project activities that will be conducted by AIDEA and by AIDEA's contractors during the Pre-Construction Phase. AIDEA is providing this Phase Plan in compliance with PA stipulation IV.E for informational purposes and will update this plan annually or as otherwise necessary, as part of the Project's Annual Work Plan (AWP).

2.0 PROJECT PHASES

As described in the PA, AIDEA proposes to construct the Project in Phases and each Phase may consist of components, stages, and segments. Components are defined as types of ancillary features, such as bridges or materials sites. Stages are defined as the specific construction steps of activities that occur for each construction Phase or Component. Segments are defined as geographical sections of the Project. AIDEA is still in the process of defining each of the phases, components, and any stages. AIDEA anticipates having more advanced plans by 2024. Construction will not take place until these plans are determined and a final investment decision is made.

Current Phase: Pre-Construction Phase (through 2024)

> **Purpose:** Complete design in consultation with the subsistence advisory committee. Decide on delivery method which will detail the projects phase, components and potential stages. Complete all required permits and acquire ROW from State and private land owners.

Phase I Construction (After Pre-Construction Phase)

> **Purpose:** Begin construction of Ambler Road
>
> **Components:**
>
> - construction camps
> - material sites
> - airstrips

- radio towers
- maintenance sites and communications equipment
- access gates
- construction equipment
- bridges, culverts, and road embankment

Stages:

- clearing vegetation from ROWs
- construction of material sources
- clearing and preparing construction camps
- placement of radio towers
- staging of equipment and labor
- hauling materials and placing fill
- excavating high areas
- grading
- installation of culverts and bridges, airstrips, maintenance facilities, and access gates
- coordination with stakeholders and subsistence advisory committee

Segments: (Depends on construction delivery method chosen)

Phase II Construction (To be determined (TBD) on Pre-Construction Phase Design and Construction Delivery Method chosen consistent with Project permits)

Purpose: Continuation of construction delivery method

Components: TBD

Stages: TBD

Segments: TBD (Depends on construction delivery method chosen)

Phase III Construction (TBD)

Purpose: TBD

Components: TBD

Stages: TBD

Segments: TBD

Operations and Maintenance Phase (50 years)

Purpose: Operate and maintain all-season roadway

Components: Previously constructed components

Stages:

- continued development/expansion of material sources
- air operations

- maintenance station operations
- hauling materials and placing fill for repairs/maintenance
- grading
- removal/reclamation of temporary construction camps not turned into maintenance stations
- continued coordination with subsistence advisory committee

Segments: All (entire Project area)

Reclamation Phase (TBD)

Purpose: Reclaim site, cease road operations

Components: Complete removal of all components and revegetation

Stages (may include):

- removal of road
- use of maintenance and communication sites
- equipment operations to remove fill, regrade, revegetate, and restore areas affected by road embankments and associated facilities

Segments: All (entire Project area)

3.0 PRE-CONSTRUCTION PHASE DESCRIPTION

The Pre-Construction Phase includes those Project activities that remain to be completed involving the collection of sufficient environmental, geologic, topographic, meteorological, hydrologic, biological, and cultural resources data needed to complete Project's permitting and front-end engineering and design (FEED), which focuses on technical requirements and helps identify the main costs included in the Project. FEED also helps establish the construction cost of a project and evaluate potential risks. AIDEA will also continue acquiring right-of-way (ROW) access from non-federal sources and securing required Project permits. AIDEA also anticipates conducting studies to develop a communications network (in conformity with the Joint Record of Decision, the Final Environmental Impact Statement, and the Environmental and Economic Analysis prepared in July 2020 by the NPS) associated with the Project that will potentially involve fiber-optic cable installed within the road prism and communication towers. The number and locations of specific communication towers will be included in a later update to this Phase Plan. The Pre-Construction Phase/FEED process began with non-ground disturbing field data collection in 2021.

4.0 PRE-CONSTRUCTION PHASE PROJECT ACTIVITIES

Project activities that AIDEA will conduct as part of the Pre-Construction Phase are necessary to complete the Project's design, engineering, and permitting, and include the following broad activity categories:

- Site Preparations and Landing Zones
- Engineering Reconnaissance
- Hydrological and Hydraulics (H&H) Investigations
- Land Survey and ROW Activities

- Fish Habitat Field Studies
- Wetlands Investigation
- Geophysical Investigations and Probing
- Geotechnical Drilling
- Cultural Resources Inventory and Evaluation Survey

Minimization efforts for the proposed 2022 non-cultural work and cultural resources inventory and evaluation survey activities are described in the Project AWP.

Detailed descriptions of the non-cultural resources activity categories are provided below. Summary tables of the fieldwork activities are presented in Attachments 1 (non-geotechnical) and 2 (geotechnical), and detailed maps are provided in Attachments 3 (non-geotechnical) and 4 (geotechnical).

4.8 Geotechnical Drilling

WHAT (Overview)

Geotechnical drilling for the 2022 AWP season (summer 2022 through April 2023) is planned to support collection of physical data to inform appropriate Project design. Objectives of the geotechnical drilling program are to characterize the subsurface conditions of the riverine environment; determine general soil characteristics along the proposed road alignment; provide information to determine bridge location as well as type and site information for facility and airstrip development; and assess the viability of the potential material sites. The objectives for the general geotechnical characterization include the identification of subsurface thermal regime and permafrost, possible bedrock, and soil type. The geotechnical drilling program will consist of

borings and installation of thermistor wells in select boreholes. Prior to commencing any geotechnical drilling and associated activities (e.g., potential water withdrawal, fuel storage), AIDEA will secure all necessary resource permits and landowner approvals.

WHERE (General Location Description)

The approved 2021 AWP included geotechnical drilling at three river crossing locations: the Koyukuk, Wild, and John rivers. The draft 2022 AWP includes similar geotechnical drilling for the remaining potential bridge locations and potential material sites as noted in Attachment 2, and along the proposed Project alignment. Locations of proposed drill sites are shown on the figures in Attachment 4.

WHEN (Schedule)

Summer Drilling

The summer geotechnical drilling program is planned to begin in June 2022 and may extend into September 2022. Drill mobilization is anticipated to take approximately two days of helicopter and crew support. Twenty-three potential bridge crossings (12 medium and large bridge crossings and 11 small bridge crossings) and 43 potential material sites will be investigated during the 2022 summer season.

Winter Drilling

Site preparation for the 2023 winter drilling season is anticipated to start in late January 2023 and take approximately four days. Drill and camp mobilization will be conducted via overland caravan from Dahl Creek and is anticipated to take approximately two days. The winter drilling program will begin in February 2023 to maximize available winter drilling days and ensure sufficient ice thickness to safely move drill spreads across rivers. Winter drilling is planned for 32 days; weather delays could extend this work. Twenty-two potential bridge crossing locations (small [n=11], medium [n=6], and large [n=5] potential bridge crossings) and up to 44 locations along the proposed roadway alignment will be investigated during winter. Locations of proposed drill sites are shown on the figures in Attachment 4.

WHO (Contractor and Team)

Drilling will be conducted under the supervision of AIDEA's consultant, PND. Depending on the drill site, one or two drill shifts per day are proposed. The anticipated personnel associated with each drill spread per shift include one driller, one driller helper, and one engineer/logger. One mechanic/driller helper will be added at the large and medium bridge sites. The geotechnical crew may also include a roving mechanic/driller helper to move between drill spreads as needed. An observer will be present at each drill site located on Doyon Limited lands.

HOW (Methods)

Site Access/Logistics

Summer Drilling

The anticipated approach for the summer geotechnical drilling program will be to dedicate one drill spread for the potential large and medium bridge crossings and one drill spread for the

potential small bridge crossings and potential material sites. The potential large and medium bridge crossings' drill sites will either be supported with a remote camp at the drill sites or be based in Dahl Creek (mid-June for 20 days) and Coldfoot (early to mid-July). Drill rigs will be staged in Bettles and/or Coldfoot and deployed as required. Helicopter support will be used to transport fuel, water, waste, personnel, and equipment as needed.

During summer, the investigation crew and drills will be transported by helicopter to the work locations. Helicopters will be used to move drills between sites, and from one side of a waterbody to the other at bridge sites during open water conditions. The sonic drills to be used are track-mounted and will typically move between boreholes at each site without requiring helicopter transport.

For logistical efficiency, the summer 2022 potential large and medium bridge crossings drilling will start in the middle of the alignment (e.g., at location MB6) and work east. The potential small bridge crossings drilling effort will begin based out of Coldfoot in mid-June for approximately 20 days, and then be based out of Dahl Creek for the remaining duration of approximately two weeks. Since it is anticipated that the drill spread used for the potential small bridges will also be used for potential material sites, the potential material sites will be drilled from west to east, based out of Dahl Creek in mid-July for approximately nine days, and then from Coldfoot for approximately nine days.

Winter Drilling

The anticipated approach for the winter geotechnical drilling program will be to dedicate one drill spread for the potential large and medium bridge crossings and one drill spread for the potential small bridge crossings and proposed alignment sites, with the possibility for each drill location to be supported by a remote camp. Drilling will begin on the west end of the alignment and move east.

During winter, the investigation crew, drills, and camp will be transported overland along rivers and tundra where vegetation, terrain, and snow cover allow. Winter overland travel will be utilized as much as possible for safety and cost reasons associated with reducing the reliance on helicopters. The actual overland routes will be within the indirect APE and run adjacent to or along the proposed road alignment to the extent practicable, or along rivers running parallel to the alignment to reduce tundra travel. Actual overland routes will depend on snowpack, ice thickness, terrain, and vegetation type. No vegetation clearing is anticipated to facilitate winter overland travel.

Mobilization of the winter program is planned to occur from Dahl Creek. All equipment and personnel will be flown to the Dahl Creek airstrip. Drills, winter camps, and fuel will be transported to the Project area via tracked vehicles. Drilling units will be assembled on ski sleds or tracked trailers. Winter camps will be assembled on tracked trailers. Approximately four tracked vehicles are anticipated to be used to transport drill rigs. The vehicle models have yet to be determined but may include Case Steiger, PistenBully, Hagglund, or Prinoth tracked vehicles and a Hagglund articulated tracked vehicle. Tracked vehicles and trailers exert less than four pounds per square inch of ground pressure and have been extensively used in tundra environments during winter travel to minimize disturbance or damage to the vegetation under snowpack.

An example of a mobile drill caravan is shown in Photograph 23, though the example is of a drill sled being pulled on a flexible sleigh by a Case Steiger tractor. Due to expected deeper snow

conditions and terrain requirements in the Project area, a PistenBully or Prinoth tracked vehicle will likely be used, and track-mounted trailers will be pulled instead of the sleighs shown. The PistenBully and Prinoth tracked vehicles are shown in Photograph 24 and Photograph 25, respectively.

Photograph 23. Example of winter mobile drill caravan.

Photograph 24. Example of PistenBully tracked vehicle.

Photograph 25. Example of Prinoth tracked vehicle.

A stationary fuel tank at the Dahl Creek airstrip will be refilled by aircraft delivery and used as the filling station for the mobile resupply tank for drill sites and remote camps. The approximately 1,200-gallon mobile resupply double-walled tank will be loaded on a skid and pulled by tracked vehicle along the established drill caravan trail to supply the camp and drilling operations.

During drilling activities, snowmachines will be used to transport personnel between boreholes and to and from the adjacent remote camp. River ice at crossing locations will be evaluated for thickness using GPR, drills, and ice augers to verify that it can safely support the weight of the drill and sleds for travel to the opposite side of the river.

Temporary Remote Camps

Temporary remote field camps typically consist of less than 24 personnel and are in place for fewer than 14 days. Temporary camps will be constructed of light, soft-wall tents and designed to minimize local area impacts. These camps will be used when helicopter commute times become excessive, and work will be concentrated in a small area for several days. Field camps used for geotechnical drilling are typically expected to consist of fewer than 12 personnel for fewer than seven days per location.

Remote camps will be mobilized from Bettles or Coldfoot in advance of the drilling equipment and personnel. Camps will be supported by additional crew members transported by ground (snowmobiles based in Bettles) and air (helicopters based in Coldfoot). The two camps will be rotated between the drill sites as the investigation advances along the alignment.

Summer Camps

Summer camps will consist of camping-style dome tents or similar and be supported via helicopter. Camps will typically be sited on upland terrain adjacent to work areas and will be installed for the minimum duration of time needed. Photograph 26 shows a typical summer camp layout.

Camp infrastructure will be sufficient to complete the work in the immediate area before demobilizing or moving to the next location. Power will be provided by small gasoline generators. Heat, if required, will be provided by small propane heaters installed in the tents. Camp staff will include a wilderness guide and cook. No bulk storage of fuel or supplies will be directly associated with the proposed camp. Water and food will be flown in via helicopter, and all trash will be removed from the site and disposed of in designated landfills or other permitted waste disposal sites. Human waste will be transported off site for disposal at a licensed facility.

After completion of camp use, all tents and related infrastructure will be immediately removed.

Photograph 26. Typical summer camp Layout.

Winter Camps

Winter field camps will be 16-person temporary remote camps staged on a fabricated trailer with snow skis or tracks. Four skids or trailers will be equipped with sleeper tents; the caravan will also include a modern spike kitchen tent; a washroom; a generator trailer with toilets, sinks, and shower stalls; a 1,000-gallon potable water tank; a skid for supplies; and a waste disposal unit. An example of the winter tent camp transported by trailer for use by personnel in winter remote camps is shown in Photograph 27. Footprints of the camp trailers will be approximately 10 ft. by 25 ft.; overall camp footprints will be approximately 100 ft. by 150 ft.

All tents will have an auxiliary heat source, either propane or oil stoves. Potable water for drinking will be delivered during regular helicopter-based resupply. Latrine facilities will be portable outhouses/shelters with human waste collected for off-site disposal. Electricity will be provided via portable gasoline generators and a temporary distribution network to the tents. Non-burnable garbage and any hazardous waste will be transported off-site for proper disposal. Camp staff will include a camp manager, medic, and cook. Winter camps will be supported by a combination of snowmobiles and helicopters, as appropriate.

Photograph 27. Example of winter tent camp to be transported by trailer and used for personnel at remote winter camps.

Fuel Storage and Transport

Fuel and potable water will be slung by helicopter to the drill sites and camp locations. All fuel will be transported by helicopter and stored in upland locations in double-walled containers with at least 110 percent containment at both the drill spread and the camp location. At least five days' worth of fuel and water will be stored at each camp in case of delayed resupply. Fuel will be stored in portable, double-walled aluminum tanks with a maximum volume of 119 gallons each. Fuel resupply to the mobile camps will typically be conducted via helicopter. Portable 119-gallon double-walled aluminum "fly tanks" will be used for bulk storage of diesel and/or Jet A fuel. Smaller 15- or 5-gallon gasoline containers will be used for camp generators and snowmobiles. Camp heat will be provided by propane heaters, which have no spill risk and may be transported via snowmobile. Up to four 119-gallon tanks may be temporarily stored at drill sites for helicopter refueling.

Fuel transfers will be conducted in accordance with all applicable regulatory requirements. Fueling procedures include spill management practices such as drip-plan placement under parked vehicles and placement of vinyl liners with foam dikes under all valves or connections to fuel tanks. Spills of any size will be cleaned and evaluated to improve spill prevention procedures. If a spill occurs, the crew will immediately stop work and evaluate the situation. The release will be reported, and the contaminated snow will be removed for disposal. No fuel transfer will occur on river ice.

Equipment

Up to four drill spreads will be utilized at any given time. The proposed 2022 geotechnical drilling program anticipates using three sonic drills and one air rotary drill, with the potential for additional smaller drills such as a small, track-mounted auger drill and a core penetrating test (CPT) drill. The type of drill used at each location will depend on the conditions encountered. The sonic drills can be used for coring rock and both frozen and unfrozen soil; unfrozen soil borehole advancement will be performed with sonic casing and split spoon/blow count sampling. The models of sonic and auger drills have not been determined and will depend on conditions encountered during the initial field efforts in March 2022. The sonic drills are anticipated to be similar to track-mounted Eijkelkamp sonic drills, shown in Photograph 28. The auger drill will likely have a footprint similar to that of a small Geoprobe 6712DT (Photograph 29).

An air rotary drill will be used if the sonic drill is unable to penetrate a soil layer. Air rotary drilling methods do not allow for continuous sampling but allow for fast and efficient drilling production in adverse soil conditions, especially massive ice formations. The use of air rotary drilling methods will occur if production rates with the sonic drill are deemed unacceptable. The model of air rotary drill used is anticipated to be similar to a T43 Beretta air rotary drill (Photograph 30).

CPTs, which can be conducted only in unfrozen ground, are an additional drilling method that consists of pushing an instrumented cone and rod into the ground to obtain in-situ soil properties. No samples are retrieved. The CPT drill, shown in Photograph 31, has a footprint similar to that of the sonic or auger drill. The specific locations of CPTs are dependent on permafrost conditions and soils encountered during initial drilling.

All drills produce a hole less than 8 in. in diameter, and there is no functional difference in drilling methods between the sonic, auger, air rotary, and CPT drills in terms of environmental impacts. A heated portable tent will be erected over the drill at each drilling location during fall and winter to provide protection from the elements and allow for continuous drilling operations.

Photograph 28. Eijkelkamp SonicSampDrill SRS-P sonic drill (photo credit: Eijkelkamp).

Photograph 29. Geoprobe 6712DT auger drill.

Photograph 30. T43 Beretta air rotary drill.

Photograph 31. CPT drill (photo credit: Geoprobe).

Borings

Boreholes will be approximately 8 in. in diameter (Photograph 32). In frozen ground, 10-ft. cores will be collected; in unfrozen ground, sonic cores will be advanced in 5-ft. intervals with standard penetrometer test blow counts. Should bedrock be encountered before the planned borehole depth, rock will be cored 15 ft. below the bottom of the unconsolidated material. Frozen cores may be transported and frozen off-site for logging or classification to increase advancement rates, while unfrozen samples will be field classified, with only representative samples collected and shipped off site. Most drill cuttings will be replaced back into the borehole, while any remaining cuttings will be spread at the surface surrounding the hole (Photograph 33).

Photograph 32. Example of completed boring.

Photograph 33. Example of post-boring area.

A summary of borehole quantities by project feature is included in Table 1. The exact number of boreholes, depths, and durations will be determined in the field based on field conditions.

Table 1. Summary of anticipated borehole quantities by Project feature.

Task	Number of Units	Borehole Depth (ft.)	Max. Borehole Quantity	Drill Days	Remote Camp	Drill Quantity	Crew Size
Large and Medium Bridges – Summer	12	100	36	27	Yes	1	7
Large and Medium Bridges – Winter	11	100	33	25	Yes	1	7
Small Bridges – Summer	11	50	22	24	No	1	3
Small Bridges – Winter	11	50	22	24	Yes	1	3
Material Sites – Summer	43	150	258	49	Yes	1	9
Alignment – Winter	44	30	44	22	Yes	1	3

Table notes:
One remote camp will support all winter activities; separate remote camps are not planned.
ft. = feet

Potential Bridge Locations

Geotechnical investigations at 23 potential bridge locations will take place during summer 2022, and investigations at the remaining 22 potential bridge locations will take place during winter conditions in early 2023. One borehole will be advanced on each side of the proposed crossing sites to provide an approximation of appropriate pile types (e.g., adfreeze, adfreeze/frictional/end-bearing hybrid, rock socketed, or warm permafrost pile), with an additional borehole advanced during winter in the river channel at the large bridge sites.

The summer investigation of potential large and medium bridges is anticipated to begin at MB6 and move eastward, with a temporary remote camp at each potential bridge location site. The potential small bridge investigation program is anticipated to begin at the easternmost end of the alignment and base out of Coldfoot as the program moves west. Weather, cultural resources survey results, and/or availability of staff and equipment may necessitate adjustments to the proposed field plan as the season advances.

Potential Material Sites

Geotechnical investigations at approximately 43 potential material sites will commence during summer 2022, generally beginning at the eastern end of the alignment and moving west. Depths and extents of gravel will control how many boreholes are progressed at each site. The purpose of the boreholes is to identify the quantity and quality of available material across each potential material site. Remote camps will be erected at each site to support drilling operations, which may be conducted up to 24 hours a day.

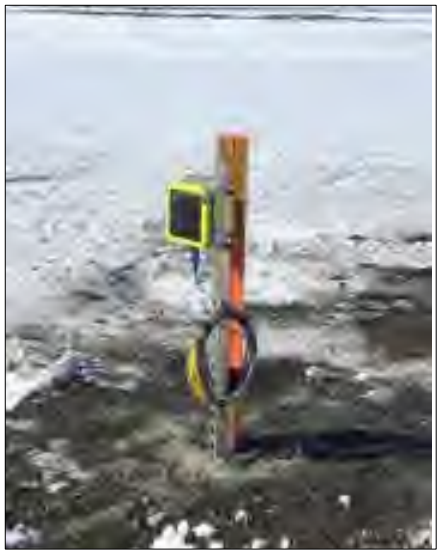
Proposed Roadway Alignment

Boreholes will be advanced at approximately 44 locations along the proposed roadway alignment during the initial phase of winter 2023 exploration, approximately every 1 mi. depending on surface conditions, terrain, vegetation, and access. Each borehole will be advanced to a proposed nominal depth of 30 ft. Soil conditions encountered during drilling, including thaw, ice-rich soils, and thaw-unstable soils, will inform how many borings are

advanced and to what depth. The goal of conducting the borings is to generalize the subsurface environment and determine general soil characteristics along the proposed alignment, including identification of permafrost and thermal regime, possible bedrock, and soil type. This information will be critical in engineering the roadway to minimize impacts on the surrounding environment. The specific locations of alignment boreholes will be determined in the field based on LZ locations and overland access constraints and may vary by approximately 1 mi.

Thermistor Wells

Thermistor wells will be installed in approximately 69 boreholes at potential bridge and proposed roadway alignment boring locations to collect thermal data at depth over time. Wells will be constructed of 1-in.-diameter Schedule 80 polyvinyl chloride (PVC) pipe. The space between PVC pipe and borehole wall will be backfilled with imported, clean, dry sand. Some thermistor wells will be equipped with a full-length digital thermal cable (DTC) installed with sensors at 2-ft. intervals. DTCs will be connected to on-site data loggers, with data transmitted by telemetry to Anchorage or collected and stored locally using a “torpedo” data logger for manual download. Dataloggers will be mounted to Unistrut posts and denoted with reflective delineators (Photograph 34). GPS coordinates will be recorded at each thermistor well. Examples of an installed datalogger are provided in Photograph 34 and Photograph 35.



Photograph 34. Example of installed thermistor well, DTC, and datalogger.

Photograph 35. Example of installed thermistor well, DTC, and datalogger.

Thermistor wells that are not instrumented with telemetry dataloggers will be capped, and the locations will be recorded using a hand-held GPS so that temperature readings can be collected later.

A summary of anticipated thermistor wells’ proposed locations and instrumentation is included in Table 2.

Table 2. Summary of anticipated thermistor wells' proposed location and instrumentation.

Location	Planned Depth (ft.)	Anticipated # of Thermistor Wells	Anticipated # of DTCs	Logger Details
Large Bridges	100	14	14	Satellite
Medium Bridges	100	9	9	Torpedo
Small Bridges	50	22	2	Satellite
Alignment	30	20	4	Torpedo
Alignment –Terrain Units	60	4	4	Satellite

Table notes:
DTC = digital thermal cable
ft. = feet

Thermistor wells will remain in place for a minimum of one year but may stay in place through the design phase of the Project. When removed, the PVC pipe will be cut at or below the ground surface as deep as practicable; dataloggers, support structures, and DTCs will be removed. Expected permafrost conditions at drill sites may freeze below-ground PVC pipe in place, prohibiting complete removal of the thermistor wells. The remaining PVC pipe will be covered with surrounding soils and tamped into place.

ATTACHMENT 2: SUMMARY TABLE OF PROPOSED 2022 GEOTECHNICAL DRILLING

Activity		Location				Max. Work Area Acreage	Description of Activity	Land Owner	Work Season	Crew Size	2021 CR Survey Complete Results
Alignment Drilling		Drilling will occur along the Potential alignment, approximately every 1 mile for 44 miles				0.03 acre per site	up to 44 boreholes, 30 feet deep	All	Winter	3	
Number (East to West)	**Component type**	**Component ID/Name**	**Map ID**	**Lat**	**Long**	**Max. Work Area Acreage**	**Description of Activity**	**Land Owner**	**Work Season**	**Crew Size**	**2021 CR Survey Complete Results**
1	Potential Material Site	Dalton Highway Existing Material Site	PMS3	67.08	-150.37	0.21 acre	4 to 6 boreholes, 150 ft deep	BLM (State Selected Land)	Summer	9	
2	Potential Small Bridge	Unnamed	SB15	67.08	-150.35	0.07 acre	up to 2 boreholes, 50 feet deep	BLM (State Selected Land)	Summer	3	
3	Potential Small Bridge	Unnamed	SB12	67.07	-150.39	0.07 acre	up to 2 boreholes, 50 feet deep	BLM (State Selected Land)	Summer	3	
4	Potential Material Site	East End Material Site #1	PMS4	67.04	-150.58	0.21 acre	4 to 6 boreholes, 150 ft deep	BLM (State Selected Land)	Summer	9	
4	Potential Small Bridge	Unnamed	SB1	67.14	-157.03	0.07 acre	up to 2 boreholes, 50 feet deep	BLM (State Selected Land)	Winter	3	
5	Potential Material Site	East End Material Site #2	SMS22	67.05	-150.63	0.21 acre	4 to 6 boreholes, 150 ft deep	BLM (State Selected Land)	Summer	9	
6	Potential Material Site	East End Material Site #3	PMS5	67.02	-150.97	0.21 acre	4 to 6 boreholes, 150 ft deep	State of Alaska	Summer	9	
7	Potential Small Bridge	Unnamed	SB10	67.03	-151.12	0.07 acre	up to 2 boreholes, 50 feet deep	Doyon, Limited	Summer	3	
8	Potential Material Site	East End Material Site #4	SMS31	67.03	-151.16	0.21 acre	4 to 6 boreholes, 150 ft deep	Doyon, Limited	Summer	9	
9	Potential Material Site	East End Material Site #5	SMS30	67.06	-151.18	0.21 acre	4 to 6 boreholes, 150 ft deep	BLM (State Selected Land), Doyon Limited, State Patent	Summer	9	
10	Potential Small Bridge	Unnamed	SB21	67.06	-151.18	0.07 acre	up to 2 boreholes, 50 feet deep	State of Alaska	Summer	3	
11	Potential Small Bridge	Unnamed	SB17	67.05	-151.33	0.07 acre	up to 2 boreholes, 50 feet deep	State of Alaska	Summer	3	
12	Potential Material Site	East End Material Site #6	SMS29	67.04	-151.59	0.21 acre	4 to 6 boreholes, 150 ft deep	Doyon, Limited	Summer	9	
13	Potential Material Site	East End Material Site #7	SMS28	67.05	-151.60	0.21 acre	4 to 6 boreholes, 150 ft deep	Doyon, Limited	Summer	9	
14	Potential Material Site	East End Material Site #8	SMS27	67.01	-151.82	0.21 acre	4 to 6 boreholes, 150 ft deep	Doyon, Limited	Summer	9	
15	Potential Small Bridge	Unnamed	SB9	67.02	-152.13	0.07 acre	up to 2 boreholes, 50 feet deep	State of Alaska	Summer	3	
16	Potential Material Site	John River Glacial Drift	SMS1	67.04	-152.15	0.21 acre	4 to 6 boreholes, 150 ft deep	State of Alaska	Summer	9	
17	Potential Medium Bridge	E.F. Henshaw Creek	MB4	67.04	-152.41	0.11 acre	up to 3 boreholes, 100 feet deep	State of Alaska	Summer	7	
18	Potential Material Site	Heart Mountain Glacial Drift	PMS6	67.06	-152.42	0.21 acre	4 to 6 boreholes, 150 ft deep	State of Alaska	Summer	9	
19	Potential Medium Bridge	S.F. Bedrock Creek	MB11	67.09	-152.73	0.11 acre	up to 3 boreholes, 100 feet deep	State of Alaska	Summer	7	
20	Potential Small Bridge	Unnamed	SB2	67.09	-152.77	0.07 acre	up to 2 boreholes, 50 feet deep	State of Alaska	Summer	3	
21	Potential Material Site	Alatna Hills Quartzite	SMS19	67.07	-152.88	0.21 acre	4 to 6 boreholes, 150 ft deep	State of Alaska	Summer	9	

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Number (East to West)	Component type	Component ID/Name	Map ID	Lat	Long	Max. Work Area Acreage	Description of Activity	Land Owner	Work Season	Crew Size	2021 CR Survey Complete Results
22	Potential Material Site	Alatna Hills Schist	PMS1	67.09	-153.03	0.21 acre	4 to 6 boreholes, 150 ft deep	State of Alaska	Summer	9	
23	Potential Medium Bridge	Unnamed	MB1	67.07	-153.12	0.11 acre	up to 3 boreholes, 100 feet deep	State of Alaska	Summer	7	
24	Potential Material Site	M.F. of Alatna Glacial Outwash	SMS3	67.07	-153.13	0.21 acre	4 to 6 boreholes, 150 ft deep	State of Alaska	Summer	9	
25	Potential Material Site	M.F. of Alatna Alluvial	SMS2	67.08	-153.15	0.21 acre	4 to 6 boreholes, 150 ft deep	State of Alaska	Summer	9	
26	Potential Large Bridge	Malamute Fork Alatna River	LB8	67.06	-153.18	0.11 acre	up to 3 boreholes, 100 feet deep	State of Alaska	Summer	7	
27	Potential Material Site	Alatna River Alluvium and Terrace Gravels	SMS4	67.07	-153.32	0.21 acre	4 to 6 boreholes, 150 ft deep	State of Alaska	Summer	9	
28	Potential Large Bridge	Alatna River	LB4	67.08	-153.33	0.11 acre	up to 3 boreholes, 100 feet deep	State of Alaska	Summer	7	
29	Potential Material Site	Helpmejack Hills Outwash	PMS7	67.06	-153.51	0.21 acre	4 to 6 boreholes, 150 ft deep	State of Alaska	Summer	9	
30	Potential Medium Bridge	Unnamed	MB12	67.06	-153.68	0.11 acre	up to 3 boreholes, 100 feet deep	State of Alaska	Summer	7	
31	Potential Material Site	North Helpmejack Piedmont Gravels	SMS5	67.06	-153.69	0.21 acre	4 to 6 boreholes, 150 ft deep	State of Alaska	Summer	9	
32	Potential Small Bridge	Unnamed	SB16	67.06	-153.80	0.07 acre	up to 2 boreholes, 50 feet deep	State of Alaska	Summer	3	
33	Potential Material Site	Alatna Portage Piedmont Gravels	PMS2	67.05	-153.88	0.21 acre	4 to 6 boreholes, 150 ft deep	State of Alaska	Summer	9	
34	Potential Medium Bridge	Unnamed	MB8	67.04	-154.01	0.11 acre	up to 3 boreholes, 100 feet deep	NPS	Summer	7	
35	Potential Medium Bridge	Unnamed	MB7	67.04	-154.15	0.11 acre	up to 3 boreholes, 100 feet deep	NPS	Summer	7	
36	Potential Large Bridge	Kobuk River	LB9	67.02	-154.36	0.11 acre	up to 3 boreholes, 100 feet deep	NPS	Summer	7	
37	Potential Medium Bridge	Unnamed	MB5	67.01	-154.45	0.11 acre	up to 3 boreholes, 100 feet deep	NPS	Summer	7	
38	Potential Small Bridge	Unnamed	SB8	67.01	-154.45	0.07 acre	up to 2 boreholes, 50 feet deep	NPS	Summer	3	
39	Potential Small Bridge	Unnamed	SB7	67.02	-154.49	0.07 acre	up to 2 boreholes, 50 feet deep	NPS	Summer	3	
40	Potential Medium Bridge	Unnamed	MB14	67.02	-154.58	0.11 acre	up to 3 boreholes, 100 feet deep	NPS	Summer	7	
4	Potential Material Site	Reed River Bluffs - Drift	PMS11	67.04	-154.82	0.21 acre	4 to 6 boreholes, 150 ft deep	State of Alaska	Summer	9	
42	Potential Large Bridge	Reed River	LB1	67.04	-154.83	0.11 acre	up to 3 boreholes, 100 feet deep	State of Alaska	Winter	7	
43	Potential Small Bridge	Unnamed	SB4	67.03	-154.93	0.07 acre	up to 2 boreholes, 50 feet deep	State of Alaska	Summer	3	
44	Potential Small Bridge	Unnamed	SB5	67.03	-154.95	0.07 acre	up to 2 boreholes, 50 feet deep	State of Alaska	Winter	3	
45	Potential Small Bridge	Unnamed	SB3	67.02	-155.07	0.07 acre	up to 2 boreholes, 50 feet deep	State of Alaska	Winter	3	

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Number (East to West)	Component type	Component ID/Name	Map ID	Lat	Long	Max. Work Area Acreage	Description of Activity	Land Owner	Work Season	Crew Size	2021 CR Survey Complete Results
46	Potential Large Bridge	Beaver Creek	LB2	67.02	-155.16	0.11 acre	up to 3 boreholes, 100 feet deep	State of Alaska	Winter	7	
47	Potential Material Site	Beaver Creek Outwash	SMS16	67.02	-155.16	0.21 acre	4 to 6 boreholes, 150 ft deep	State of Alaska	Summer	9	
48	Potential Material Site	Beaver Creek Drift	SMS6	67.02	-155.19	0.21 acre	4 to 6 boreholes, 150 ft deep	State of Alaska	Summer	9	
49	Potential Material Site	W Beaver Creek Piedmont 2*	SMS18	67.01	-155.32	0.21 acre	4 to 6 boreholes, 150 ft deep	State of Alaska	Summer	9	
50	Potential Material Site	W Beaver Creek Piedmont 1*	SMS17	67.01	-155.31	0.21 acre	4 to 6 boreholes, 150 ft deep	State of Alaska	Summer	9	
51	Potential Medium Bridge	Krumpet Creek	MB15	67.00	-155.45	0.11 acre	up to 3 boreholes, 100 feet deep	State of Alaska	Winter	7	
52	Potential Material Site	NE Narvak Lake Piedmont Gravels	PMS10	67.00	-155.46	0.21 acre	4 to 6 boreholes, 150 ft deep	State of Alaska	Summer	9	
53	Potential Small Bridge	Unnamed	SB19	67.01	-155.57	0.07 acre	up to 2 boreholes, 50 feet deep	State of Alaska	Winter	3	
54	Potential Material Site	E Avaraart Lake Drift 2*	SMS8	67.02	-155.61	0.21 acre	4 to 6 boreholes, 150 ft deep	State of Alaska	Summer	9	
55	Potential Material Site	E Avaraart Lake Drift 1*	SMS7	67.03	-155.62	0.21 acre	4 to 6 boreholes, 150 ft deep	State of Alaska	Summer	9	
56	Potential Small Bridge	Unnamed	SB22	67.03	-155.65	0.07 acre	up to 2 boreholes, 50 feet deep	State of Alaska	Winter	3	
57	Potential Material Site	Avaraat Lake Andesite	SMS20	67.05	-155.70	0.21 acre	4 to 6 boreholes, 150 ft deep	State of Alaska	Summer	9	
58	Potential Material Site	S Avaraart Lake Drift 1*	SMS9	67.02	-155.76	0.21 acre	4 to 6 boreholes, 150 ft deep	State of Alaska	Summer	9	
59	Potential Material Site	S Avaraart Lake Drift 2*	SMS10	67.02	-155.79	0.21 acre	4 to 6 boreholes, 150 ft deep	State of Alaska	Summer	9	
60	Potential Medium Bridge	Coal Creek	MB6	67.02	-155.85	0.11 acre	up to 3 boreholes, 100 feet deep	State of Alaska	Summer	7	
61	Potential Material Site	Mauneluk River Basalt	SMS21	67.02	-155.98	0.21 acre	4 to 6 boreholes, 150 ft deep	State of Alaska	Summer	9	
62	Potential Material Site	Mauneluk River Alluvial Terrace	PMS9	67.02	-156.03	0.21 acre	4 to 6 boreholes, 150 ft deep	State of Alaska	Summer	9	
63	Potential Medium Bridge	Mauneluk River	MB9	67.01	-156.07	0.11 acre	up to 3 boreholes, 100 feet deep	State of Alaska	Winter	7	
64	Potential Large Bridge	Mauneluk River	LB6	67.01	-156.07	0.11 acre	up to 3 boreholes, 100 feet deep	State of Alaska	Winter	7	
65	Potential Medium Bridge	Huffman Creek	MB13	67.02	-156.08	0.11 acre	up to 3 boreholes, 100 feet deep	Northwest Arctic Borough	Winter	7	
66	Potential Medium Bridge	Halfman Creek	MB10	67.05	-156.14	0.11 acre	up to 3 boreholes, 100 feet deep	State of Alaska	Winter	7	
67	Potential Material Site	E Ambler Lowlands PG B*	SMS12	67.06	-156.26	0.21 acre	4 to 6 boreholes, 150 ft deep	State of Alaska	Summer	9	
68	Potential Material Site	E Ambler Lowlands PG A*	SMS11	67.06	-156.28	0.21 acre	4 to 6 boreholes, 150 ft deep	State of Alaska	Summer	9	
69	Potential Material Site	E Ambler Lowlands PG C	SMS13	67.06	-156.30	0.21 acre	4 to 6 boreholes, 150 ft deep	State of Alaska	Summer	9	
70	Potential Material Site	E Ambler Lowlands G Drift	SMS23	67.04	-156.39	0.21 acre	4 to 6 boreholes, 150 ft deep	BLM (NANA Selected Land)	Summer	9	
71	Potential Small Bridge	Unnamed	SB11	67.03	-156.40	0.07 acre	up to 2 boreholes, 50 feet deep	BLM (NANA Selected Land)	Winter	3	

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Number (East to West)	Component type	Component ID/Name	Map ID	Lat	Long	Max. Work Area Acreage	Description of Activity	Land Owner	Work Season	Crew Size	2021 CR Survey Complete Results
72	Potential Material Site	E Ambler Lowlands Alluvial Fan	SMS24	67.01	-156.41	0.21 acre	4 to 6 boreholes, 150 ft deep	NANA	Summer	9	
73	Potential Small Bridge	Unnamed	SB13	67.02	-156.43	0.07 acre	up to 2 boreholes, 50 feet deep	NANA	Winter	3	
74	Potential Small Bridge	Unnamed	SB14	67.02	-156.44	0.07 acre	up to 2 boreholes, 50 feet deep	NANA	Winter	3	
75	Potential Small Bridge	Unnamed	SB6	67.03	-156.52	0.07 acre	up to 2 boreholes, 50 feet deep	NANA	Winter	3	
76	Potential Small Bridge	Unnamed	SB20	67.02	-156.66	0.07 acre	up to 2 boreholes, 50 feet deep	NANA	Winter	3	
77	Potential Large Bridge	Kogoluktuk River	LB7	67.02	-156.69	0.11 acre	up to 3 boreholes, 100 feet deep	NANA	Winter	7	
78	Potential Material Site	Kogoluktuk River Alluvium	SMS25	67.03	-156.67	0.21 acre	4 to 6 boreholes, 150 ft deep	NANA	Summer	9	
79	Potential Material Site	Kogoluktuk River Drift/Alluvium	PMS8	67.01	-156.69	0.21 acre	4 to 6 boreholes, 150 ft deep	NANA	Summer	9	
80	Potential Small Bridge	Unnamed	SB18	67.06	-156.71	0.07 acre	up to 2 boreholes, 50 feet deep	NANA	Winter	3	
81	Potential Material Site	Ambler Lowlands Marble	SMS26	67.07	-156.74	0.21 acre	4 to 6 boreholes, 150 ft deep	NANA	Summer	9	
82	Potential Material Site	Central Ambler Lowlands Glacial Drift	SMS14	67.08	-156.75	0.21 acre	4 to 6 boreholes, 150 ft deep	NANA	Summer	9	
83	Potential Medium Bridge	Ruby Creek	MB3	67.10	-156.92	0.11 acre	up to 3 boreholes, 100 feet deep	NANA	Winter	7	
84	Potential Large Bridge	Shungnak River	LB10	67.12	-156.97	0.11 acre	up to 3 boreholes, 100 feet deep	NANA	Winter	7	
85	Potential Material Site	Shungnak River Drift and Terrace Gravels	PMS12	67.13	-156.98	0.21 acre	4 to 6 boreholes, 150 ft deep	BLM (State Selected Land), NANA	Summer	9	
87	Potential Medium Bridge	Unnamed	MB2	67.15	-157.04	0.11 acre	up to 3 boreholes, 100 feet deep	BLM (State Selected Land)	Winter	7	
88	Potential Material Site	Ambler River Alluvium	SMS15	67.16	-157.05	0.21 acre	4 to 6 boreholes, 150 ft deep	BLM (State Selected Land)	Summer	9	

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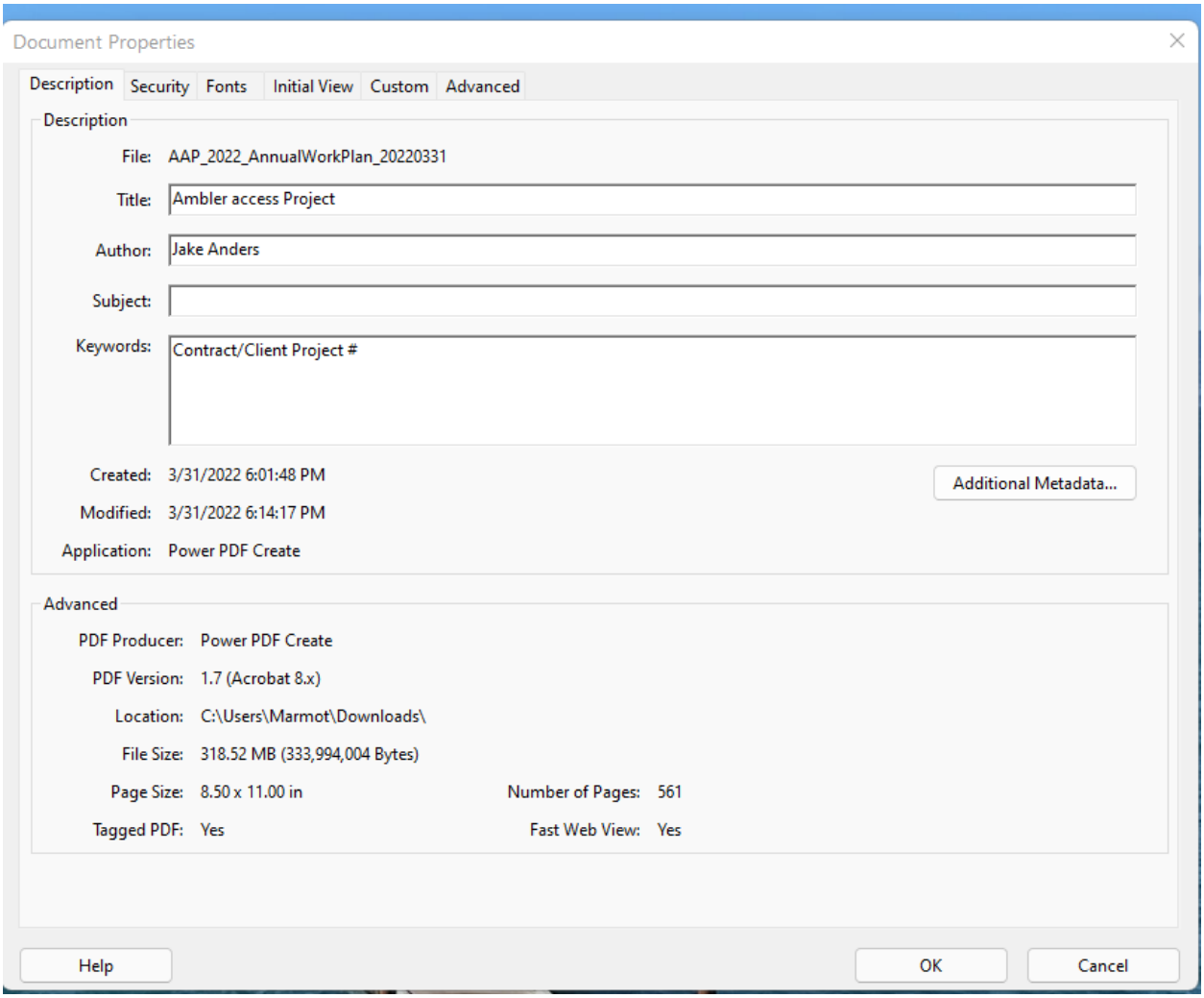
2022 Annual Work Plan – March 31, 2022

DOCUMENT PROPERTIES



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2022 Annual Work Plan – March 31, 2022

ONLINE SUBMISSION TO BLM